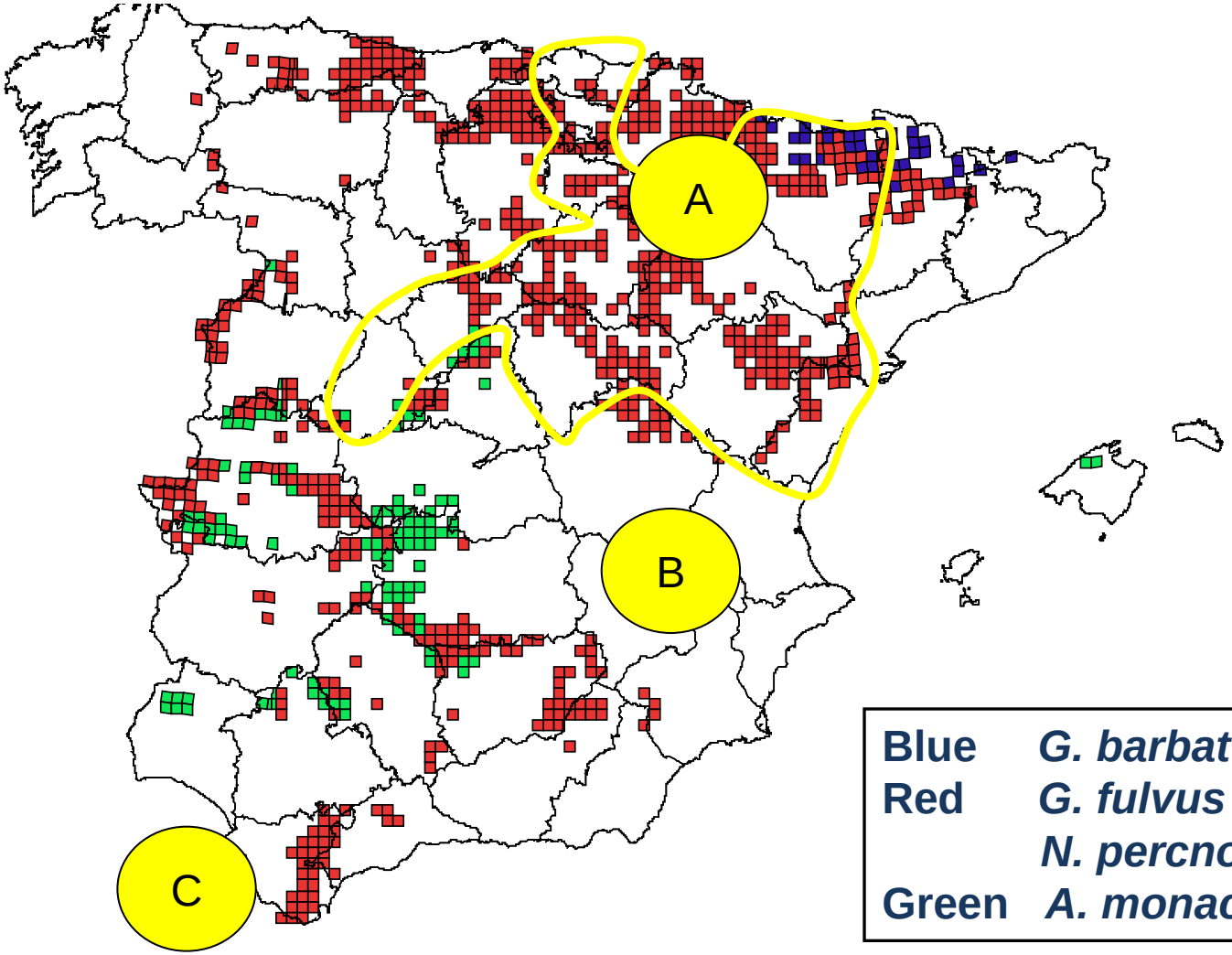

Vultures, Bats and Wind farms
golan regional council
מכון שמיר למחקר
SHAMIR RESEARCH INSTITUTE
ISRAEL NATURE AND PARKS AUTHORITY

WIND ENERGY : COLLISIONS

- Eurasian Griffon vulture
- Bearded vulture
- Cinereous (Black) vulture
- Egyptian vulture
- Rüppell’s Griffon Vulture
- White-Backed Vulture

WIND ENERGY : COLLISIONS



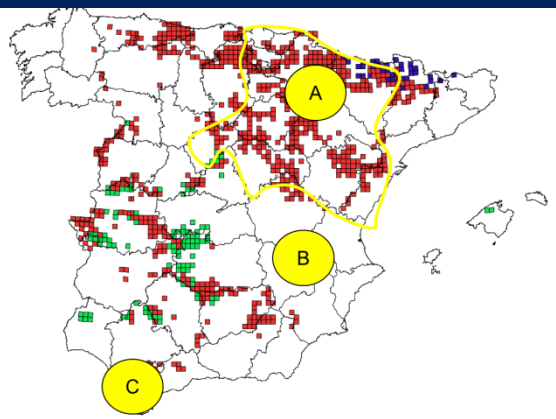
Blue	*G. barbatus*
Red	*G. fulvus*
	N. percnopterus
Green	*A. monachus*

FATALITIES

Area	A	B	C
Wind farms	206	78	73
Turbines	4217	1071	908
Turbines sampled	57.4%	49.3%	100%

Collisions	2000-2015	2003-2012	1993- 2016
Gyps fulvus	2585*	21	1860 (88%)
Gyps rueppellii	-	-	5
Gyps africanus	-	-	2
Aegypius monachus	2+3	-	1
N. Percnopterus	5	-	9
G. barbatus	-	-	-

FATALITY RATES

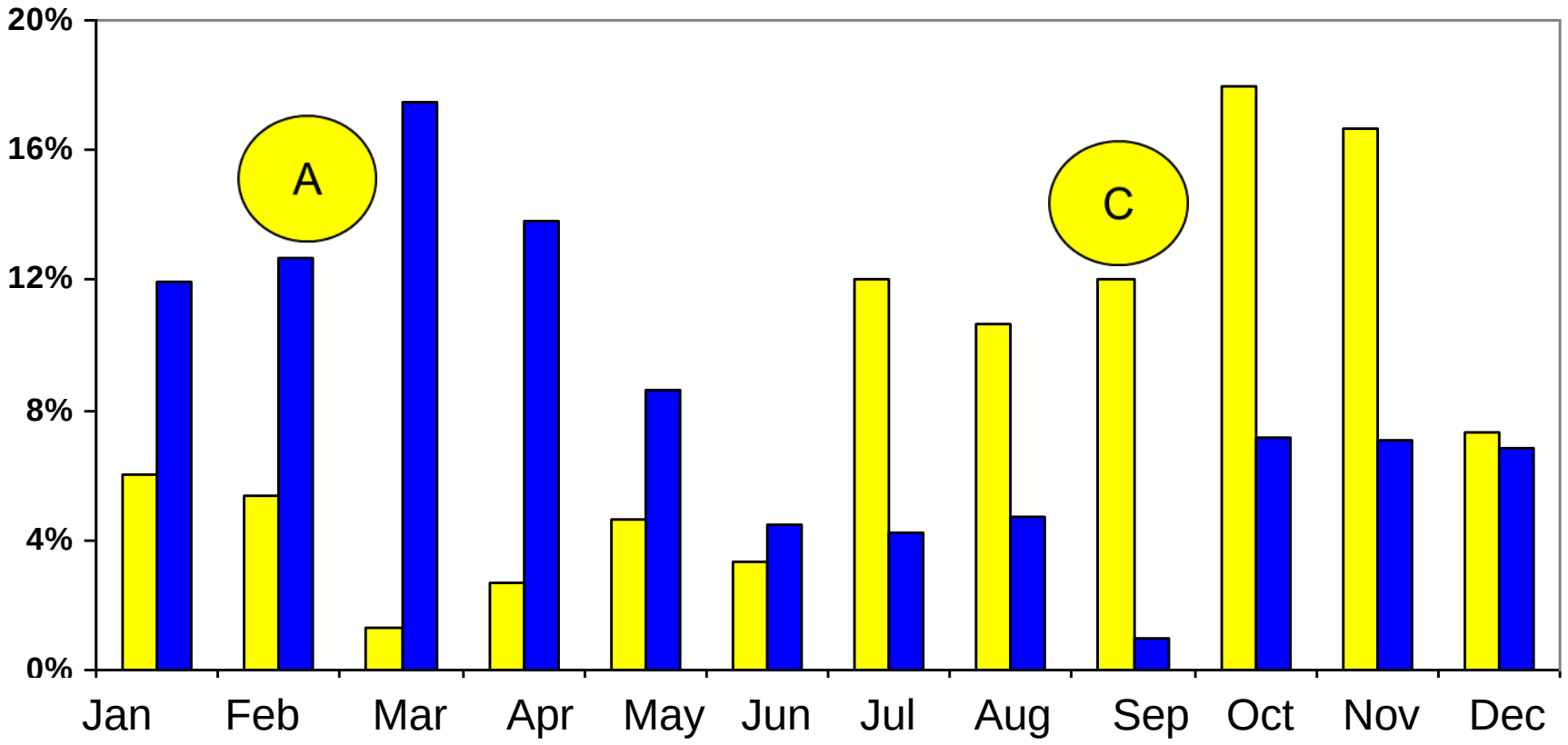


Area	A	B	C
Wind farms	125	64	63
Turbines	3305	1879	908
Turbines sampled	57.45%	49.39%	100%
Fatality rates	**0.18**	**0.002**	**0.15-0.36**

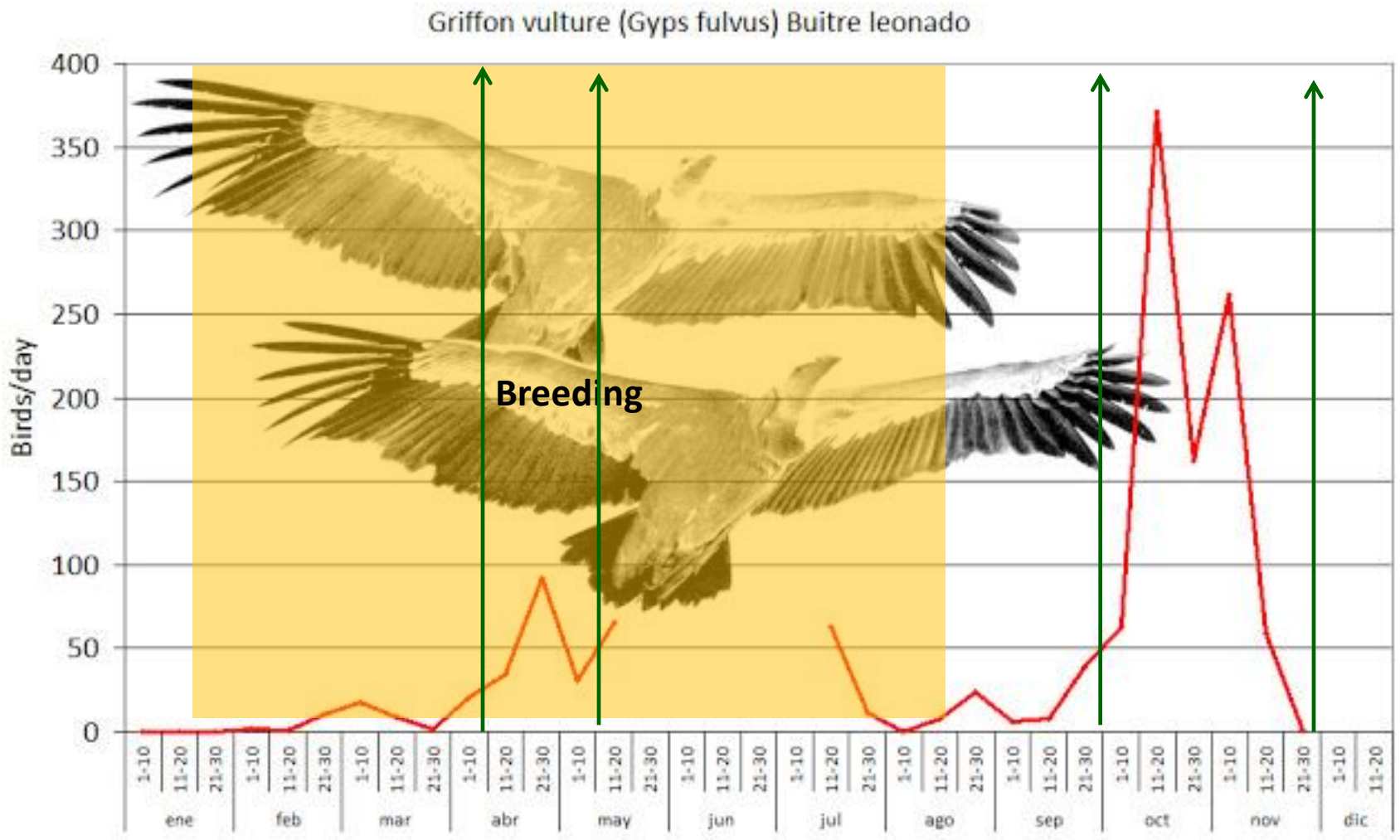
735-935 Vultures /year

SAME SPECIES BUT DIFFERENT SITES

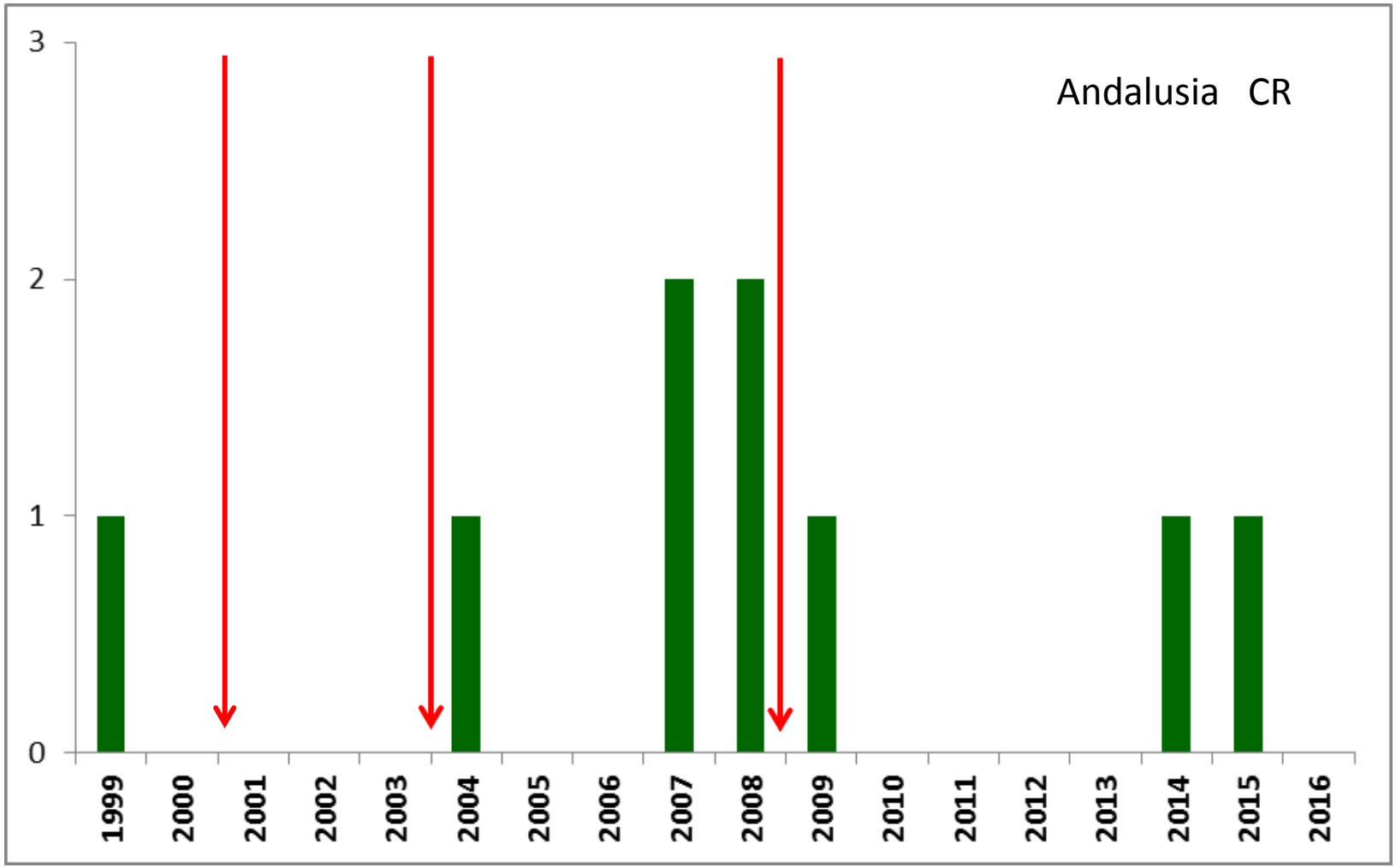
Monthly % of fatalities over the year



Griffon Vulture



THE NEED OF LONG TERM POST CONS MONITORING (Egyptian Vulture)



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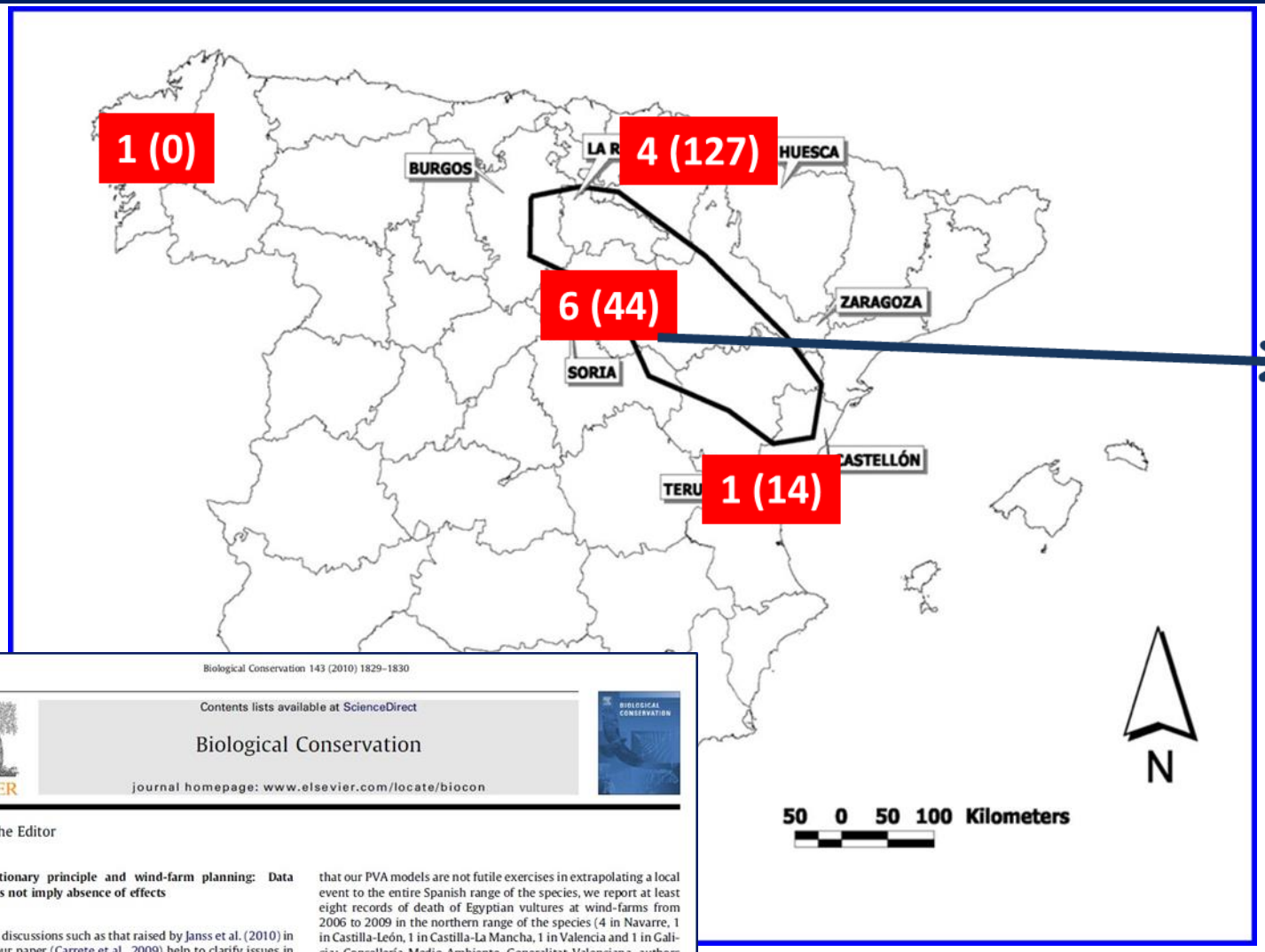

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ELSEVIER

Letter to the Editor

The precautionary principle and wind-farm planning: Data scarcity does not imply absence of effects

Scientific discussions such as that raised by Janss et al. (2010) in relation to our paper (Carrete et al., 2009) help to clarify issues in

that our PVA models are not futile exercises in extrapolating a local event to the entire Spanish range of the species, we report at least eight records of death of Egyptian vultures at wind-farms from 2006 to 2009 in the northern range of the species (4 in Navarre, 1 in Castilla-León, 1 in Castilla-La Mancha, 1 in Valencia and 1 in Galicia; Consellería Medio Ambiente, Generalitat Valenciana, authors

Carrete M, Sànchez-Zapata, JA, Benítez JR, Camiña A, Lekuona JM, Montelio E, Donázar JA (2010)

OTHER SITES IN EUROPE WITH VULTURE FATALITIES

FRANCE: At least three (R. neuze, pers. Comm.)

ITALY: N/A

GREECE: 4 + 1 Crete (All Griffon Vultures); 1 Cinereous Vulture 0.07 Vultures /T/year
(*Carcamo et al. 2011; Dotau et al. 2011)*

JORDAN: 0

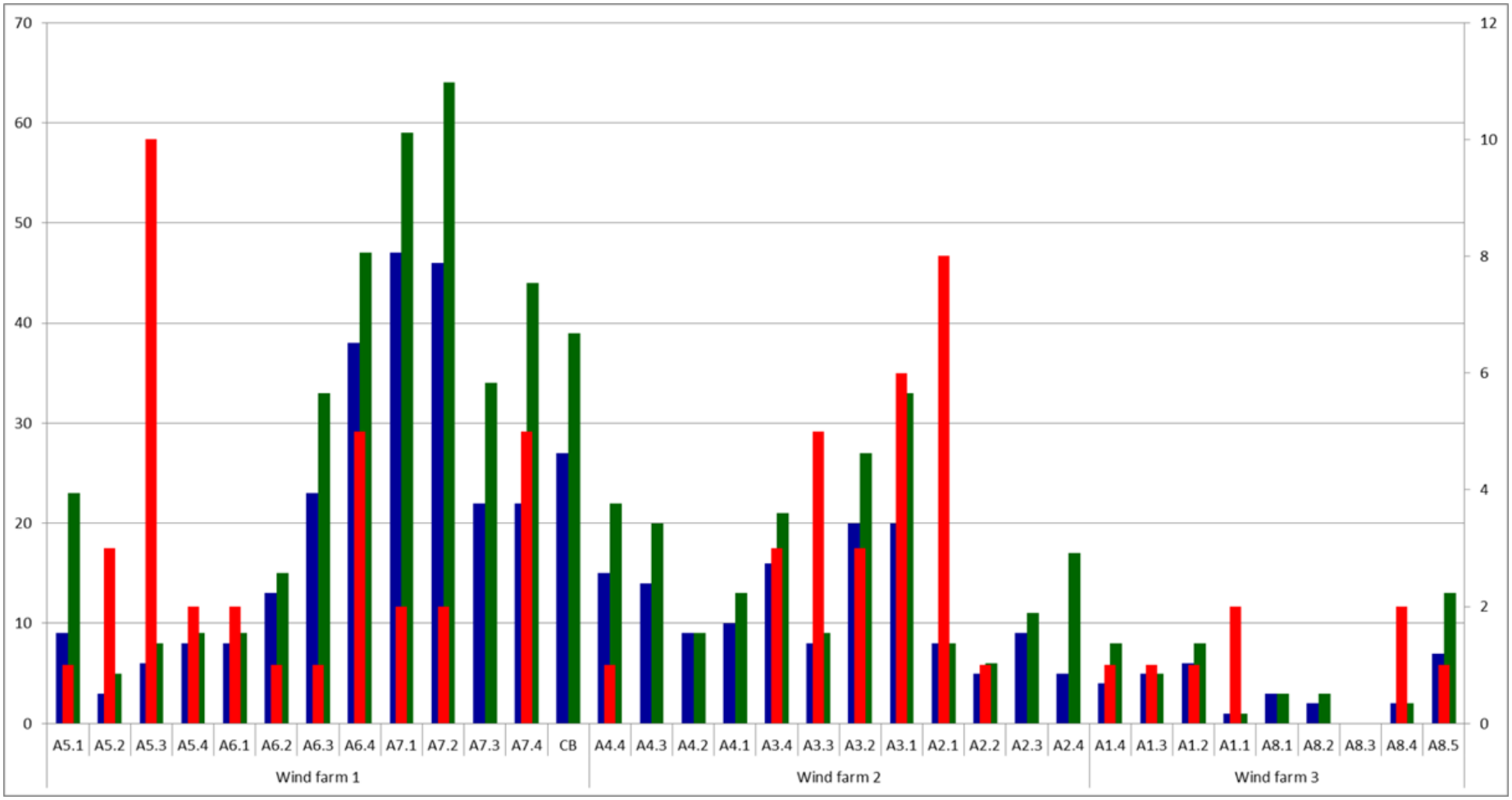
BULGARIA: 1 Griffon V.

PORTUGAL: 3 Griffons (*Strix, 2012*)

Species migrating vs colliding

SPECIES		Number	Collisions	2005-2012
Ciconia ciconia	White Stork	132,608	107	0.014 (15-41)
Ciconia nigra	Black Stork	3,597	3	0.0003* (0-1)
Gyps fulvus	Griffon V.	9,928	1,173	0.166 (63-240)
Pernis apivorus	Honey Buzzard	61,560	21	0.002 (0-12)
Milvus migrans	Black Kite	162,074	218	0.024 (31-71)
Neophron perc.	Egyptian V.	1,283	5	0.001 (0-2)
Aquila pennata	Booted Eagle	21,930	100	0.013 (5-27)
Circaetus gallicus	S-Toed Eagle	29,680	81	0.012 (3-20)
Accipiter nisus	Sparrowhawk	4,404	20	0.003 (1-6)
C. aeruginosus	Marsh Harrier	2,196	17	0.002 (0-6)
Circus pygargus	Montagu's H.	1,287	31	0.005 (2-11)
P. haliaetus	Osprey	845	8	0.001 (0-3)
F. naumanni	L. Kestrel	9,900	66	0.009 (4-18)
		440,292		

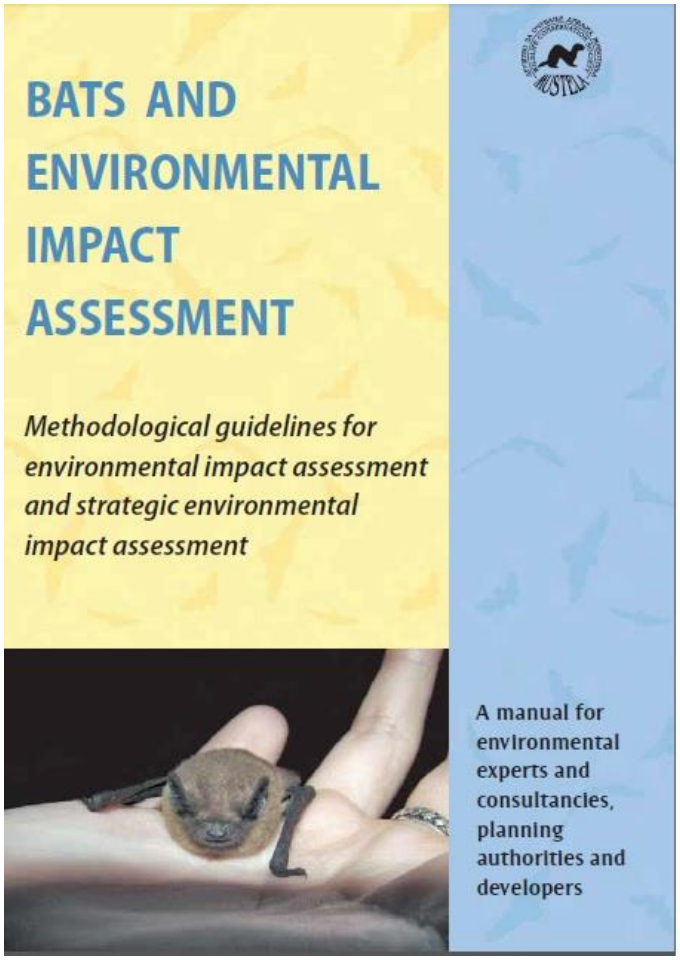
Lack of relationship: birds at risk vs collisions



Reasons of mortality

- **Biology of the species.**
- **Environmental variables.**
- **Wind farm characteristics.**

Wind energy: Bats (post-cons)



Wind energy: Bats (post-cons)

- *At least three years of monitoring during the operational phase. According to the results, another 3 years may be necessary to gain a complete understanding.*
- *monitoring of activity at nacelle height will be more important*

Wind energy: Bats (post-cons)

- *The recorded bat activity should be analyzed taking into account the season, the time of night and weather data such as wind speed and air temperature*.
- *species-specific detectability- Implication for bat detectors-skills of the monitoring teams.*

Post cons monitoring of bats

Out 1,662 Collisions
147 involved bats
(8.84%)
56 wind farms

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doi: ???

Bat fatalities at wind farms in northern Spain — lessons to be learned

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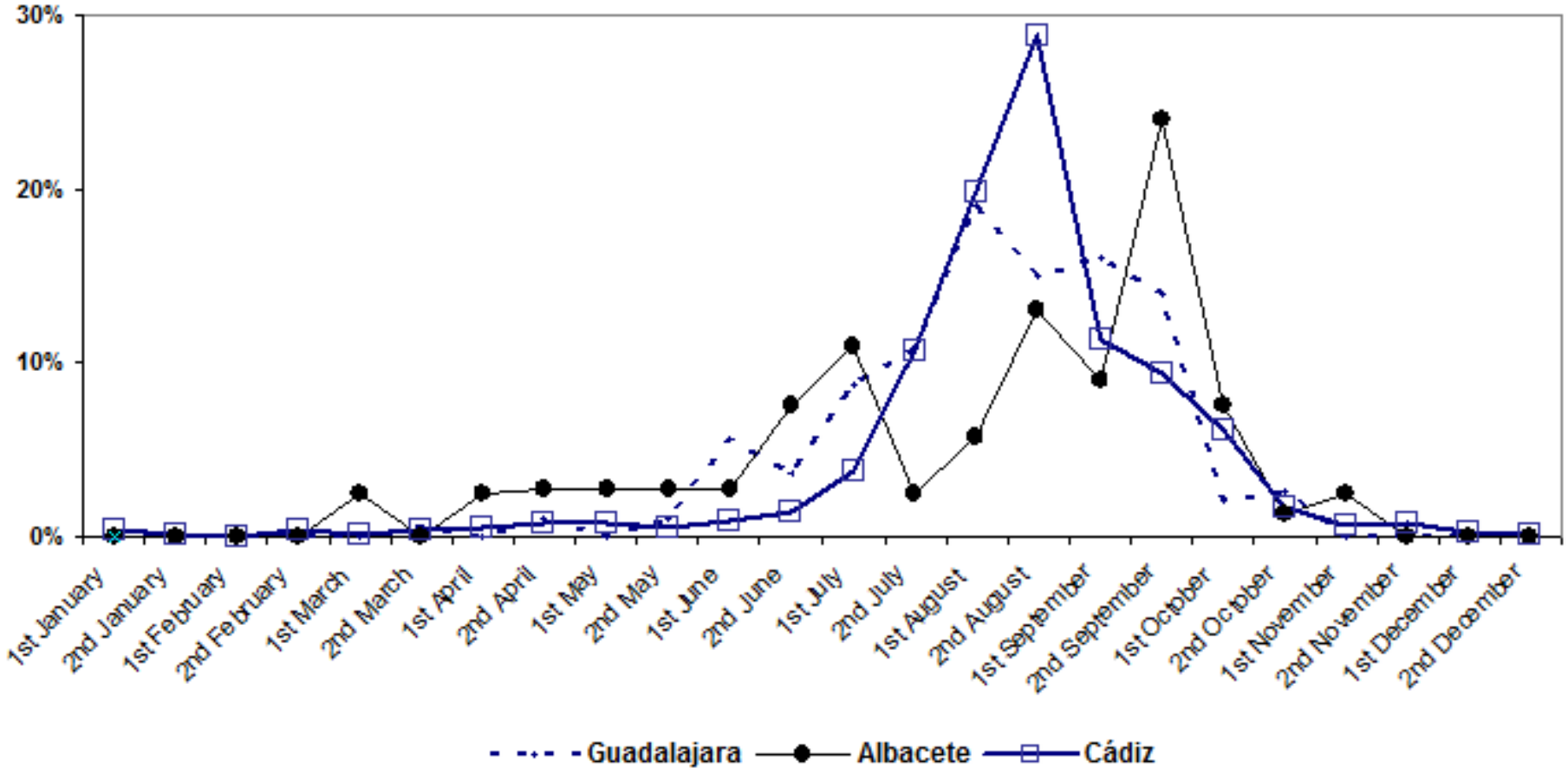
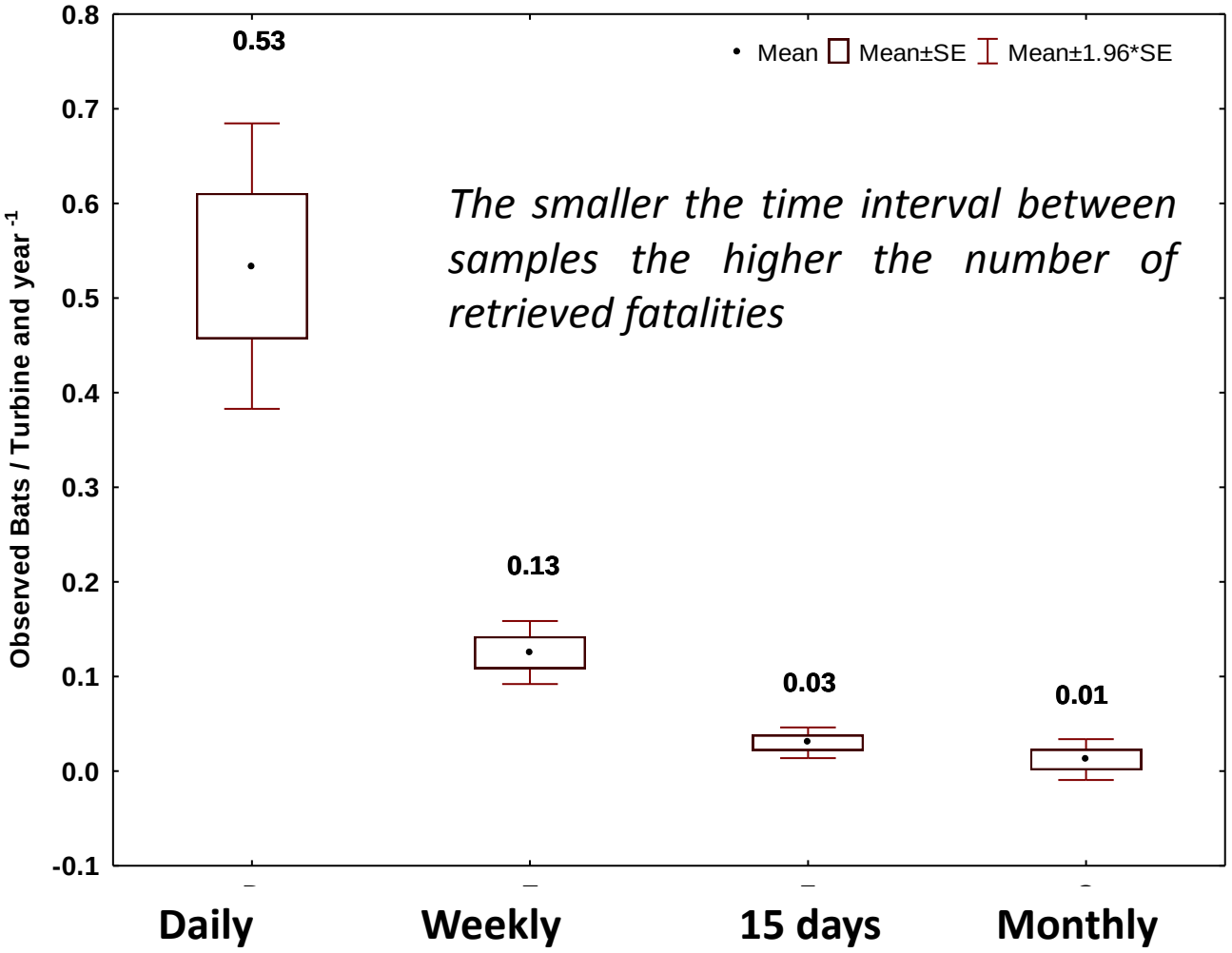
I analysed bat fatalities reported from 56 wind farms in the La Rioja, Soria and Aragón regions of northern Spain. Post-construction monitoring surveys revealed 147 fatalities belonging to seven species of bats, namely *Pipistrellus pipistrellus* (59%), *P. kuhlii* (14%), *Hypsugo savii* (18%), *Barbastella barbastellus*, *Nyctalus lasiopterus*, *N. leisleri* and *Tadarida teniotis* (< 5% each). In the mostly low elevations sites in Aragon, fatalities occurred between March and December and peaked (76%) from July to October. In the La Rioja and Soria provinces, where wind farms mostly are located at higher elevations, fatalities occurred between May and October and without any obvious late summer peak. The reports reviewed here revealed many deficiencies in their protocols that prevent comparisons with other studies nationally and internationally. For example, only five reports (9%) accounted for searcher efficiency or carcass removal biases. Consequently, fatality estimates appeared to be negatively associated with the number of turbines in the wind farm and also with the monitoring frequency, so that fewer bats seem to be killed when the monitoring intervals were longer. This should be of considerable concern for environmental authorities in Spain and elsewhere. Despite rapid development of wind power facilities in Spain, the impact surveys that are carried out at present are clearly inadequate with respect to bats.

Key words: bats, environmental impacts, mortality, monitoring, shortfalls, Spain, wind farms

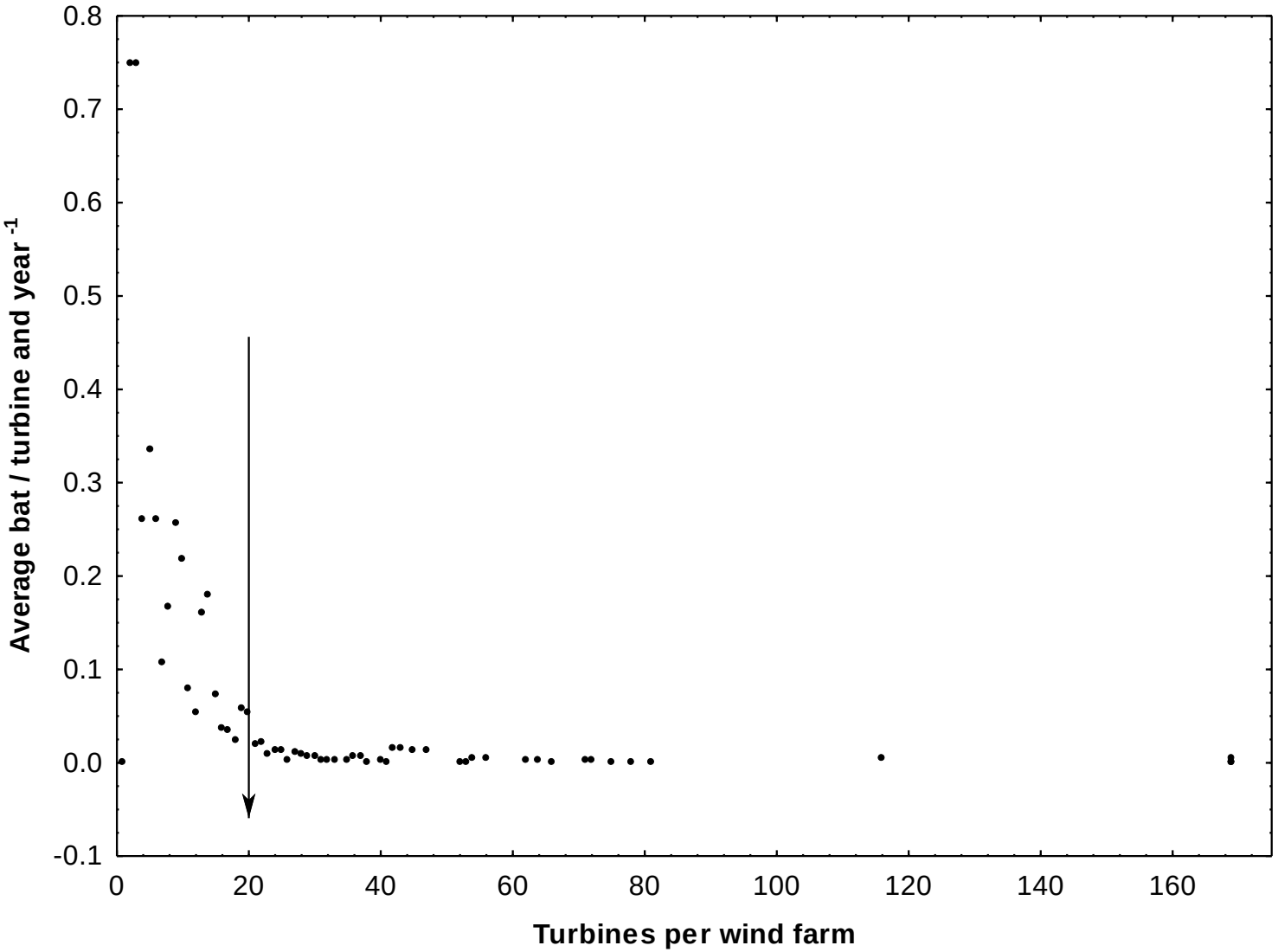
Distribution of fatalities



Fatality rates vs monitoring frequency



Fatality rates vs WF size



2015 review (in press)

3,987 Bat fatalities of 23 species

	Spain	Portugal	Croatia	France	Italy	Greece
TOTAL	**1,928**	**812**	**8**	**1028**	**10**	**194**
Pipistrellus p.	57.53%					LC
Hypsugo savii	11.05%					LC
Nyctalus leisleri	12.86%					LC
Miniopterus sch.	0.38%					NT
Myotis bch.	0.04%					NT
Nyctalus lasiop.	2.07%					NT
Barbastella b.	0.13%					NT

Source: EUROBATS (2013) & own data.

Origin of the bats

Contents lists available at SciVerse ScienceDirect

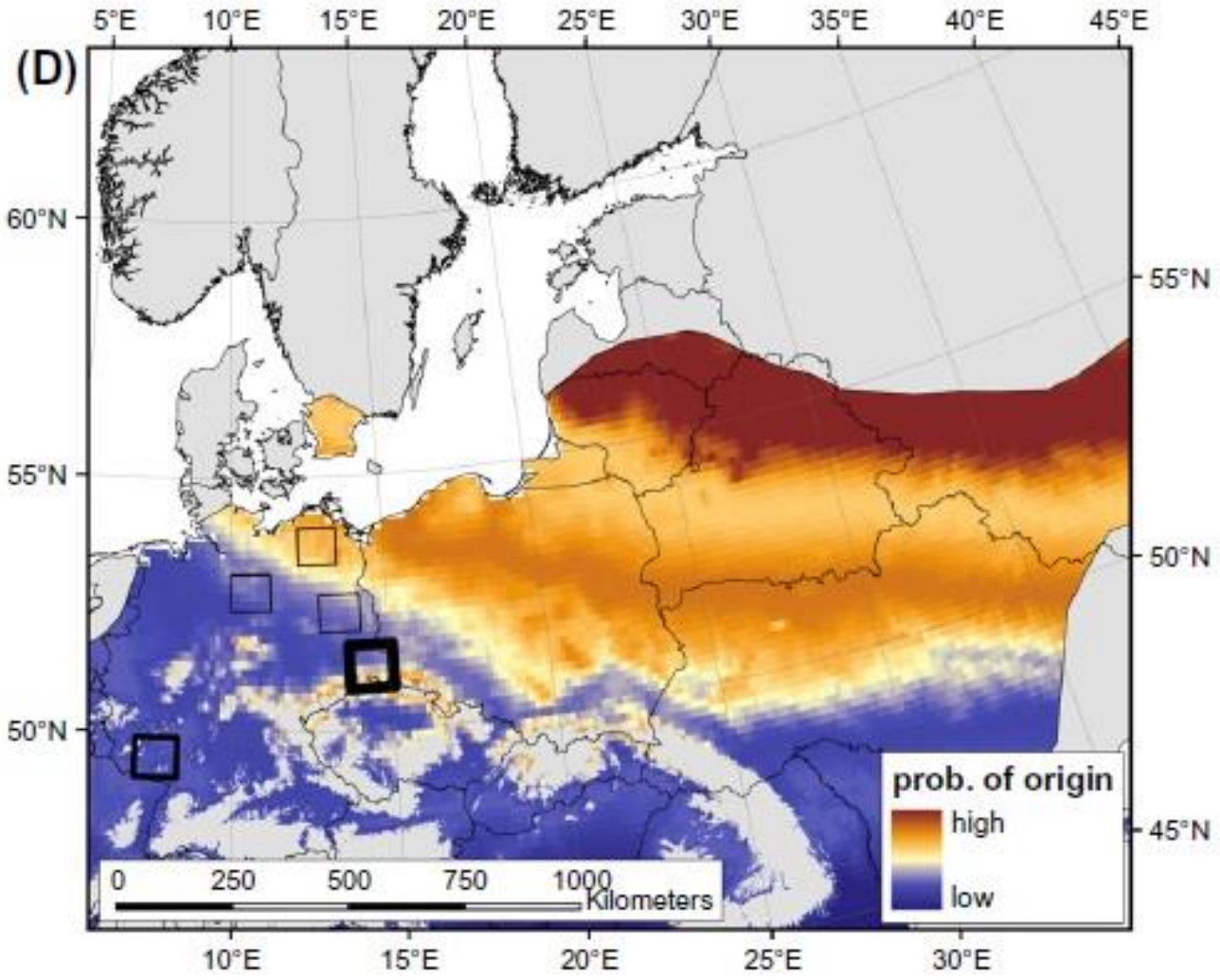
Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

The catchment area of wind farms for European bats: A plea for international regulations

Christian C. Voigt [a,*], Ana G. Popa-Lisseanu [a], Ivo Niermann [b], Stephanie Kramer-Schadt [a]

Origin of the bats



Pre & post cons monitoring (other countries)

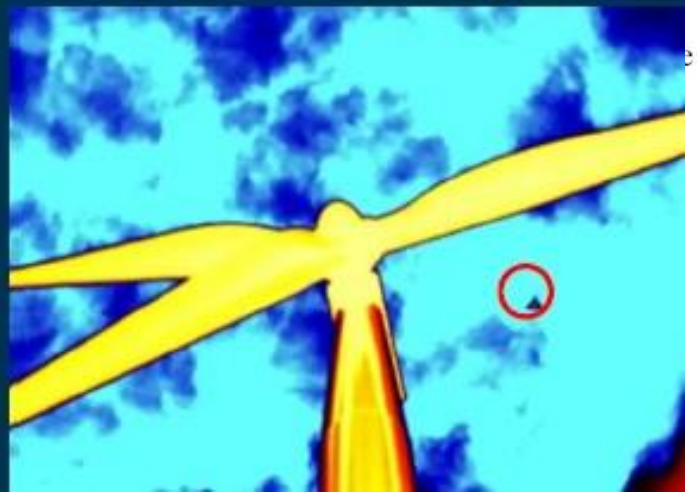
South Africa

Balkans (Serbia)

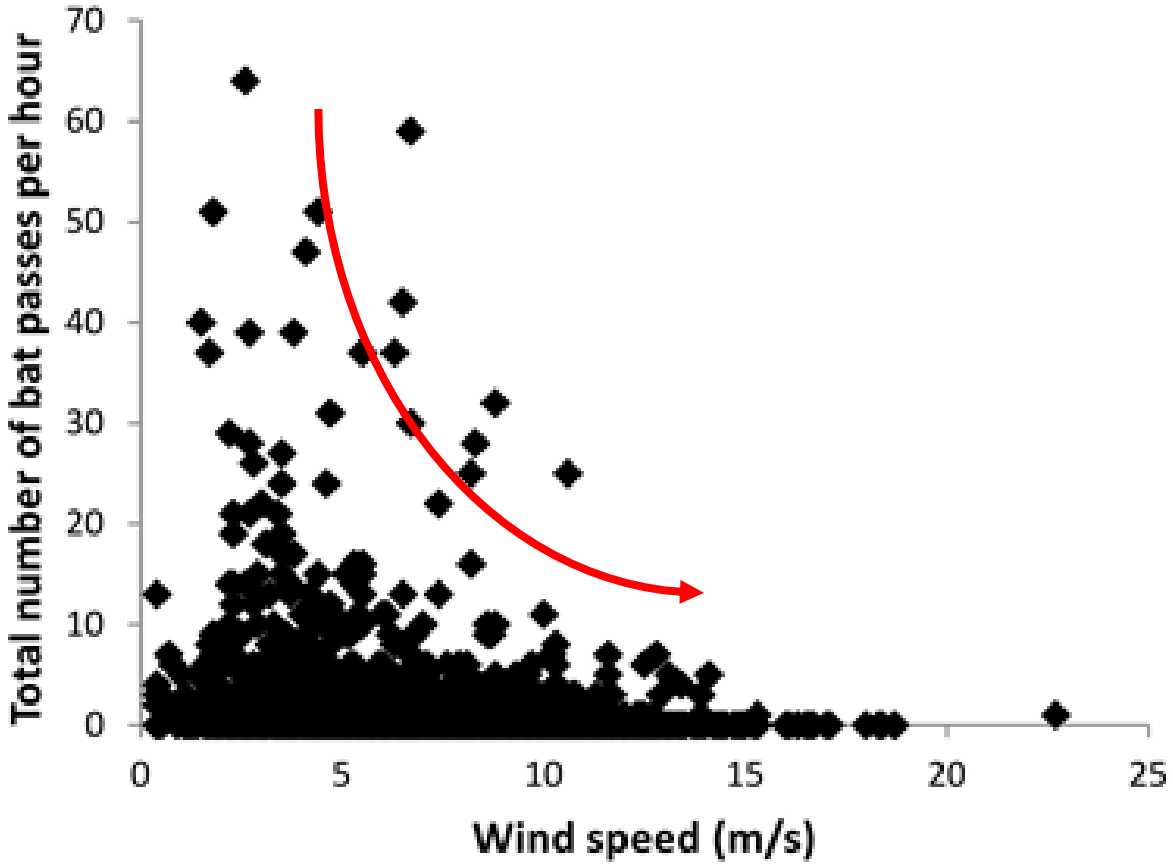
UK

Are Bats Attracted to Turbines?

- Bats rely on vision, air currents, & echolocation
- Bats may not be able to discriminate turbines from trees
  - Tall cylindrical "trunks" = towers
  - Visually conspicuous "crowns" = nacelle
  - Radially extending "branches" = blades
- Bats may expect important resources when arriving at these "trees"
  - Roosts, conspecifics, &/or prey



Effect of wind speed



Post-cons Monitoring & Mitigation

- **WIND FARMS**

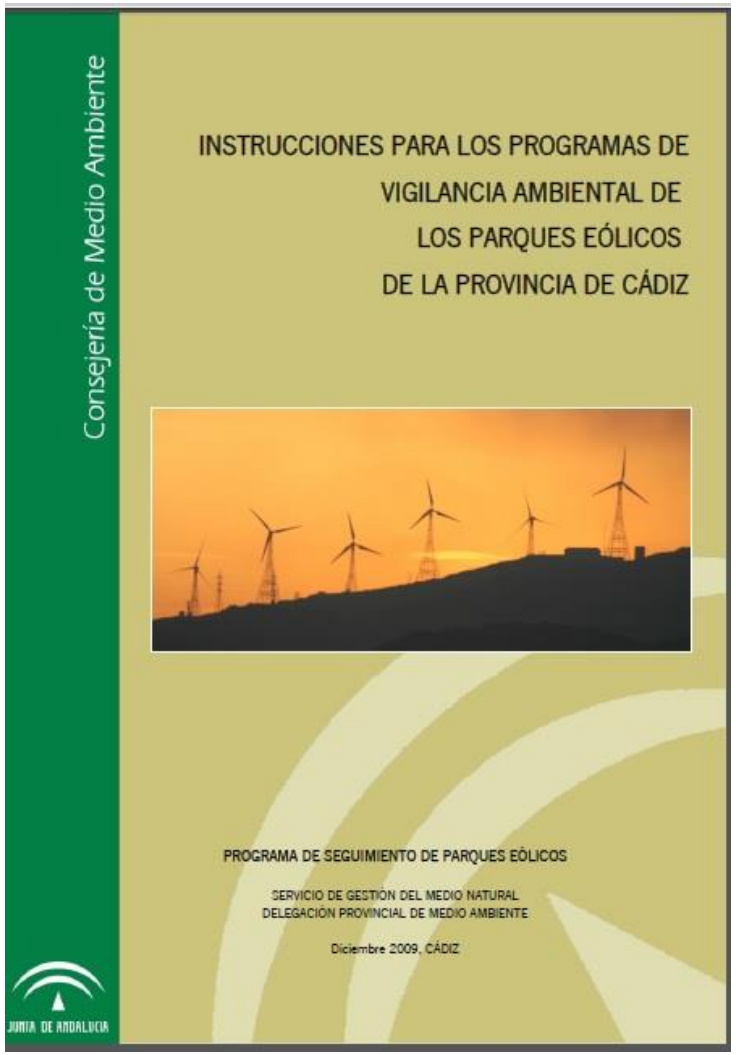
a) From 8:00 am to

b) 16:00-20:30 pm

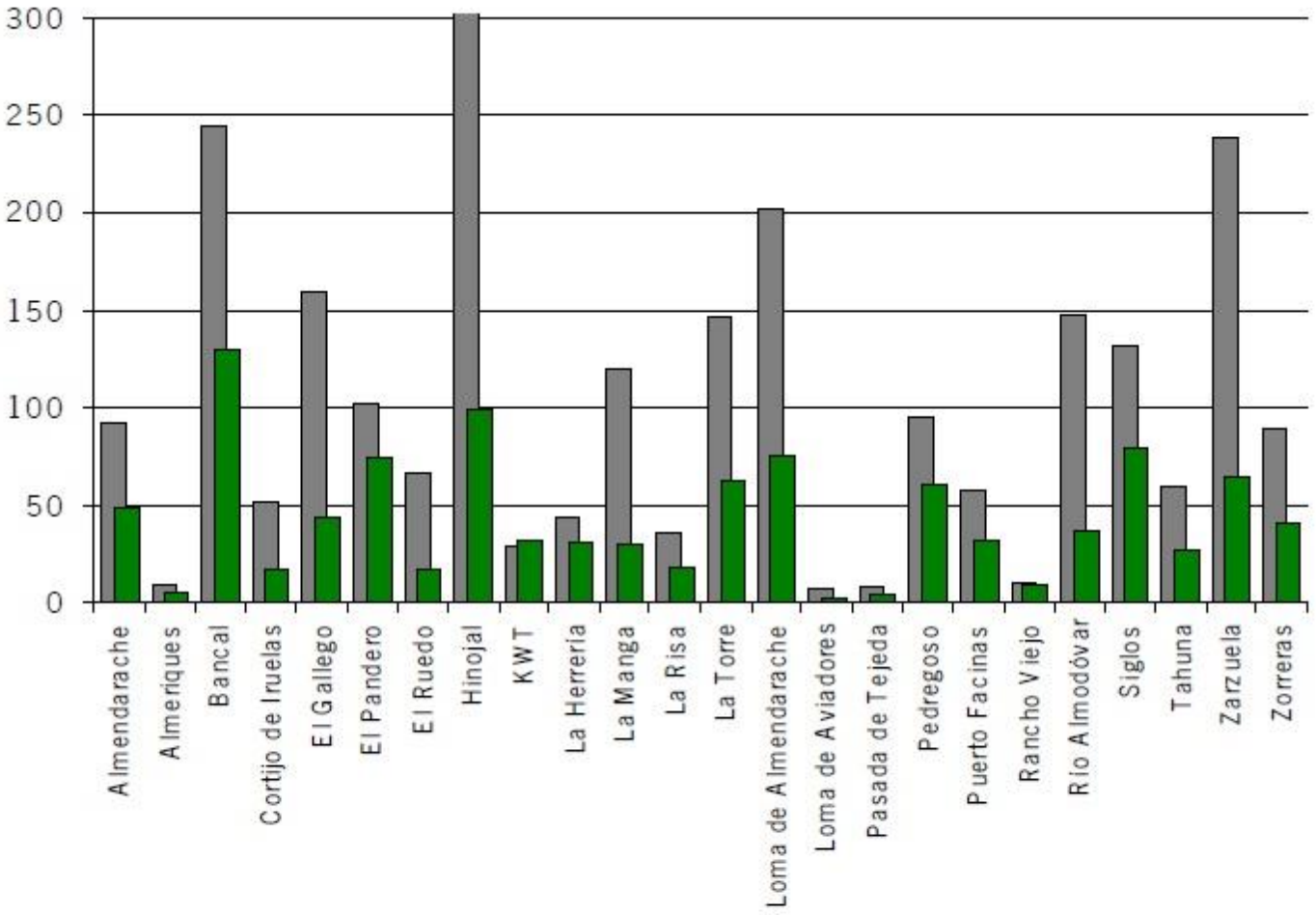
according to season

(9-12 Daylight hours /day)

b) Fatalities, birds use, control for collision risk situations.



Shut-down (observers)



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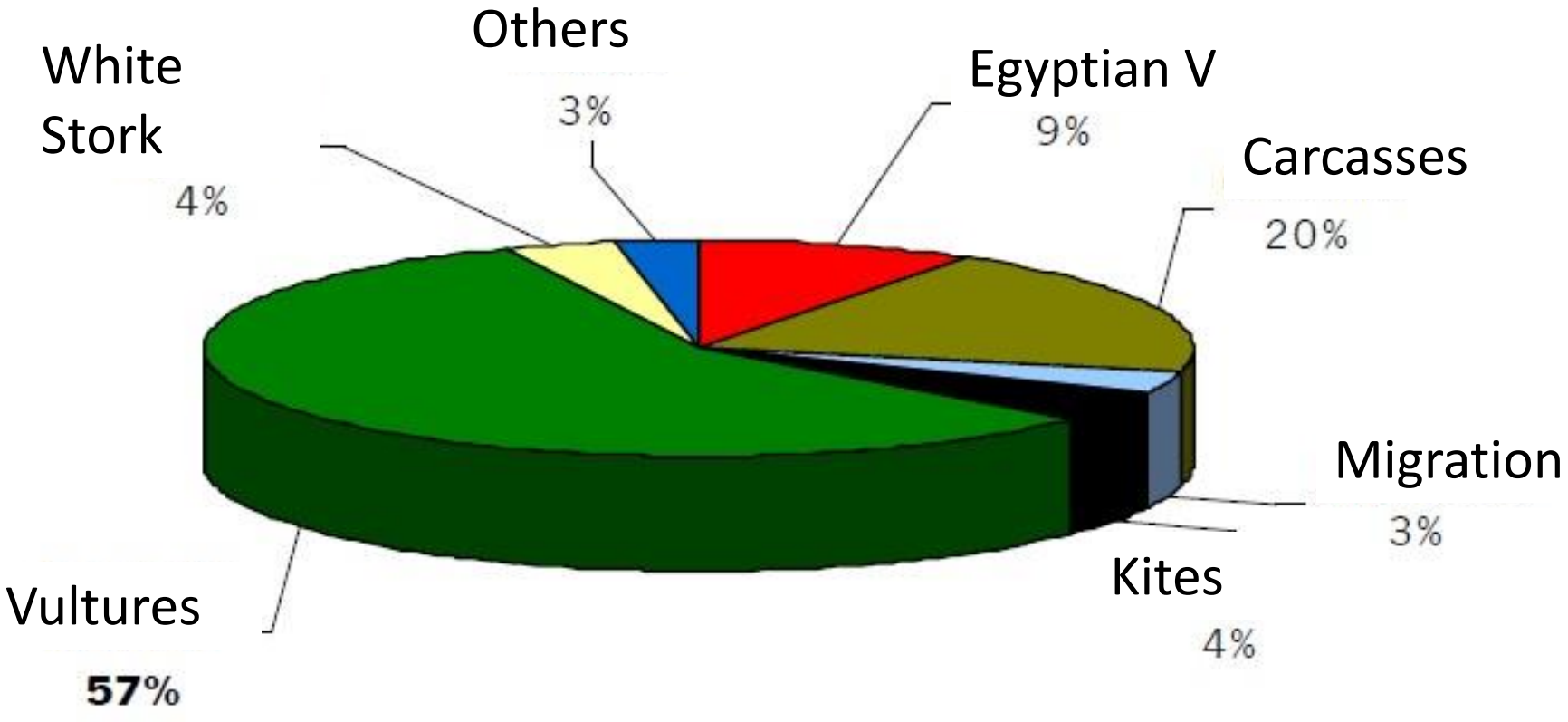

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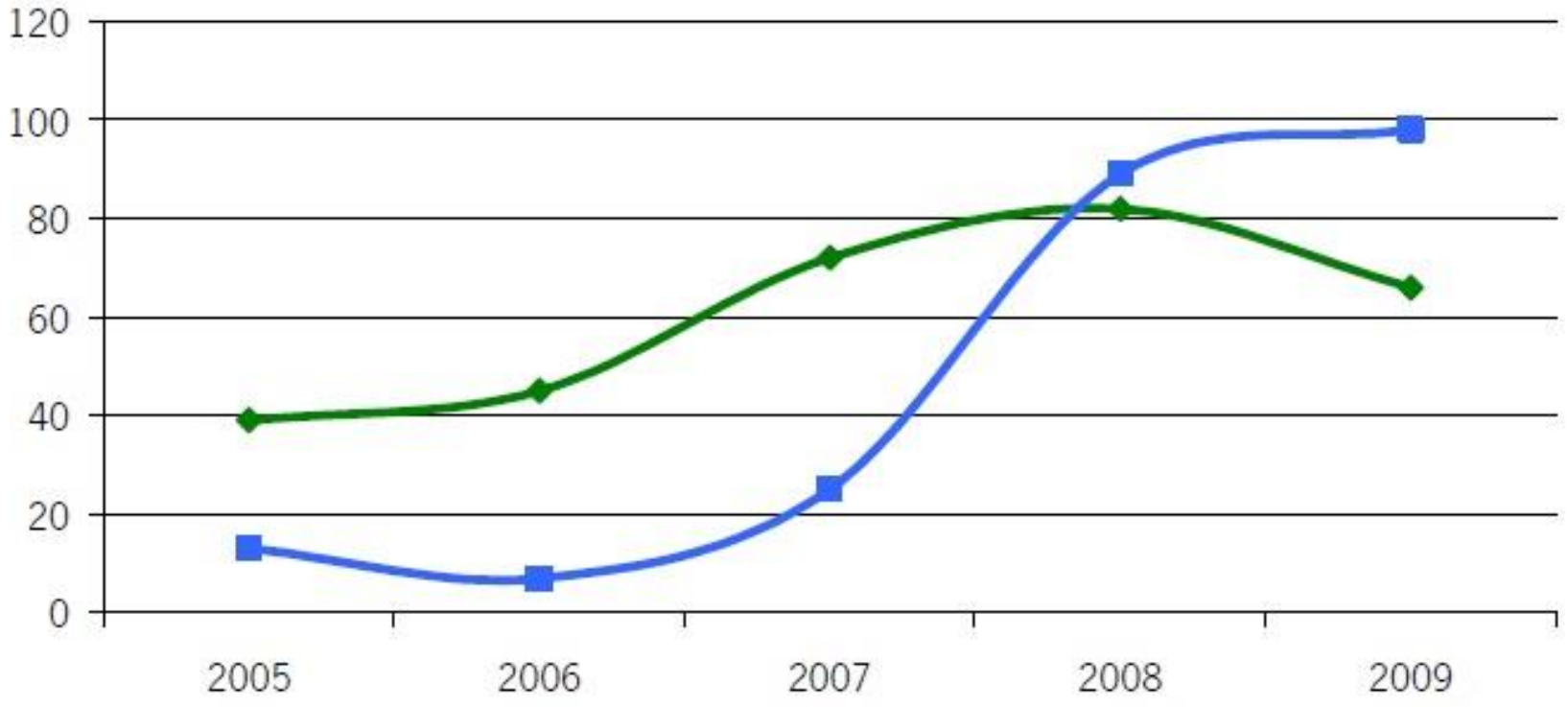

Number of collisions (Gvulture)

Radar?

DT Bird

2 modules:
Disuassion
Stops

WT Bird

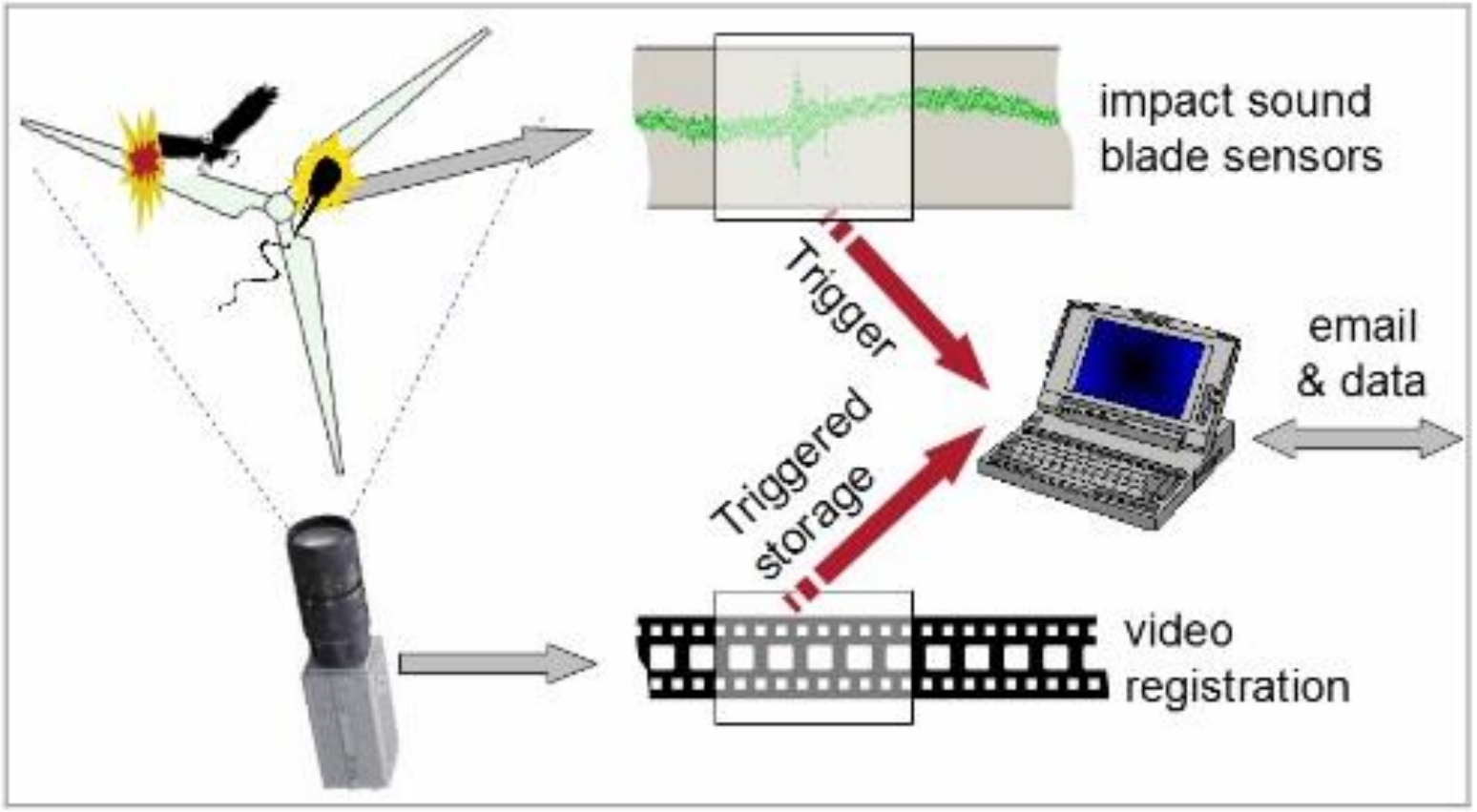

Figure 1: Principle of WT-Bird operation

Bladeless wind turbines

Thank you!!!

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